

CONTACT INFORMATION Department of Computing Science 9637 77th Ave NW
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RESEARCH INTERESTS **Reinforcement learning**, robotics, knowledge representations, representation learning, time series prediction and machine learning.

ACADEMIC POSITIONS **Research Associate, Adjunct Professor** July 2017-Present
Department of Computer Science, University of Alberta

Assistant Research Scientist 2016-May 2017
Department of Computer Science, Indiana University

EDUCATION **Postdoctoral Fellow** 2015-2016
Department of Computer Science, Indiana University

Doctor of Philosophy in Computing Science 2015
University of Alberta
Advisor: Professor Richard Sutton
Thesis topic: Developing a predictive approach to knowledge

Master of Science in Computing Science 2006
University of Alberta
Advisor: Professor Richard Sutton
Thesis topic: A Standard System for Benchmarking in Reinforcement Learning

Bachelor of Science in Computer Science 2004
University of New Brunswick
Honors with a Specialization in High Performance Scientific Computing

PUBLICATIONS **Refereed Conference Articles**

Accelerated Gradient Temporal Difference Learning, Yangchen Pan, Adam White, Martha White. AAAI Conference on Artificial Intelligence, 2017.

Introspective Agents: Confidence Measures for General Value Functions, Craig Sherstan, Marlos C. Machado, Adam White, Patrick M. Pilarski. Artificial General Intelligence (AGI), 2016.

Investigating practical linear temporal difference learning, Adam White, Martha White. International Conference on Autonomous Agents and MultiAgent Systems (AAMAS), 2016.

Adapting the trace parameter in reinforcement learning, Martha White, Adam White. International Conference on Autonomous Agents and MultiAgent Systems (AAMAS), 2016.

Scaling life-long off-policy learning, Adam White, Joseph Modayil, Richard S. Sutton. IEEE International Conference on Development and Learning and Epigenetic Robotics (ICDL), 2013. (Distinguished paper)

Multi-timescale nexting in a reinforcement learning robot, Joseph Modayil, Adam White, Richard Sutton. From Animals to Animats, 2012.

Acquiring Diverse Predictive Knowledge in Real Time by Temporal-difference Learning, Joseph Modayil, Adam White, Patrick Pilarski, Richard Sutton. Systems, Man, and Cybernetics, 2012.

Horde: A scalable real-time architecture for learning knowledge from unsupervised sensorimotor interaction. Richard Sutton, Joseph Modayil, Michael Delp, Thomas Degris, Patrick Pilarski, Adam White, Doina Precup. International Conference on Autonomous Agents and Multiagent Systems, 2011.

Interval Estimation for Reinforcement-Learning Algorithms in Continuous-State Domains, Martha White and Adam White. Advances in Neural Information Processing Systems (NIPS), 2010.

Feature construction for reinforcement learning in hearts, Nathan Sturtevant, Adam White. Computers and Games, 2007.

Journal Articles

Multi-timescale Nexting in a Reinforcement Learning Robot, Joseph Modayil, Adam White, Richard Sutton. Adaptive Behavior, 2014.

The reinforcement learning competitions, Shimon Whiteson, Brian Tanner, Adam White. AI Magazine, 2010.

RL-Glue: Language-independent software for reinforcement-learning experiments, Brian Tanner, Adam White. The Journal of Machine Learning Research, 2009.

Thesis

A Standard System for Benchmarking in Reinforcement Learning, Adam White, Master's Thesis, University of Alberta, 2006.

Developing a predictive approach to knowledge, Adam White, Doctoral Thesis, University of Alberta, 2015.

AWARDS

Reviewer Award for the 2015 International Conference on Machine Learning

Paper of Distinction at the IEEE International Conference on Developmental Robotics and Epigenetic Robotics, 2012

Best Paper at the International Workshop on Evolutionary and Reinforcement Learning for Autonomous Robot Systems, 2013

National NSERC Scholarships:

- 70,000 over two years in PhD (NSERC CGS D, 2008)
- 17,500 over one year in MSc (NSERC CGS M, 2005)

Provincial Alberta Innovates Scholarship:

- 150,000 over five years in PhD (2006)

Three national NSERC undergraduate research scholarships.

Several institutional awards including the Queen Elizabeth II Doctoral Prize (2006) and the Walter H. Johns Fellowship (2005, 2006)

RESEARCH EXPERIENCE

Algorithmic Considerations for Off-policy Reinforcement Learning, Indiana University School of Informatics 2015 - present

Since January 2015 I have been working as an Assistant Research Scientist, primarily on new algorithms for reinforcement learning. During this time I have worked on two separate projects. The first is a met-learning algorithm to adjust one of the key parameters of temporal difference learning methods, which if not set appropriately can cause divergence in practice. The second project is a direct follow up on my PhD work. The aim of the second project is to elicit the cases where parallel off-policy reinforcement learning should provide the best gains over sequential on-policy learning.

Knowledge Representation Learning on Mobile Robots, Reinforcement learning and artificial intelligence (RLAI) lab 2006 - present

During my PhD I worked on knowledge representation and learning on mobile robots. I have developed a formal language for representing knowledge of the world as predictions about future experience and developed algorithms that allow massive scale predictive knowledge learning in real-time on real robots. I have worked with several robot platforms including (1) a sensor-rich, custom-made robot, (2) off-the-shelf vacuum robots, and (3) humanoid platforms.

Standardizing Reinforcement Learning Software, RLAI lab 2004 - 2006

During my masters I worked on developing a standardized experiment framework for reinforcement learning. Different from supervised learning, where benchmark experiments can be encoded in static data files, in reinforcement learning the agent and environment are programs that interact in real-time. I developed a protocol, software implementation, and suite of benchmarks that have all been used by numerous research groups, in publications in international venues, and in several international competitions.

TEACHING
AND
SUPERVISION
EXPERIENCE

CS B659: Reinforcement Learning, Indiana University (Graduate)
Instructor: designed all lectures, assignments, and course projects
Spring 2016, Spring 2017

CMPUT 609: Reinforcement Learning for Artificial Intelligence, University of Alberta (Graduate)

Guest lecturer on reinforcement learning software
Fall 2007

CMPUT 340: Introduction to Numerical Methods, University of Alberta (undergraduate)

Teaching assistant in an upper-level computer science course. I was responsible for teaching a weekly lab section, giving occasional seminars, and marking; I determined content and structure of each of my lecture.

Fall 2004

Supervised a high school summer student as part of the Women in Scholarship, Engineering, Science & Technology Summer 2006

Supervised two programmers for the RL-Glue project Fall 2005 - Summer 2008

TALKS

Indiana University Department of Statistics Colloquium Series, Invited talk: *Continual prediction learning on robots*, November 2016

2016 AAMAS, Singapore, *Investigating practical linear temporal difference learning*, May 2016

Intelligent and Interactive Systems Seminar, Indiana University *Developing a predictive approach to knowledge*, April 2016

The 9th Barbados Workshop on Reinforcement Learning, *Experiences trying to put it all together*, April 2015

AAAI Workshop on Decision Making With Big Data. *Surprise and curiosity in big data reinforcement learning*, July 2014

ICDL. *Scaling life-long off-policy learning*, December 2012

Invited Talk Flowers Group, INRIA France. *Parallel off-policy knowledge acquisition*, September 2012

International Workshop on Evolutionary and Reinforcement Learning for Autonomous Robot Systems, *Acquiring a Broad Range of Empirical Knowledge in Real Time by Temporal-Difference Learning*, August 2012

The 7th Barbados Workshop on Reinforcement Learning, *Real-time Off-policy Learning from Big Data in Robotics*, April 2012

The 6th Barbados Workshop on Reinforcement Learning, *Multi-time-scale Nexting in a Reinforcement Learning Robot*, April 2011

The 5th Barbados Workshop on Reinforcement Learning, *Feature Selection for Hearts and a Trail Towards Feature Discovery for a Mobile Robot*, March 2010

AAMAS 2011. *Horde: A Scalable Real-time Architecture for Learning Knowledge from Unsupervised Sensorimotor Interaction*, May 2011

NIPS Reinforcement Learning Workshop: Benchmarks and Bakeoffs II, *A New Evaluation Framework for Reinforcement Learning Experiments*, Invited talk, December 2005

Regular lab seminars and periodic University of Alberta Tea Time Talks (2004-Present).

SERVICE AND
OUTREACH

Reviewer

- Program committee Artificial Intelligence and Statistics Conference
- Program committee for the AAAI Conference on Artificial Intelligence
- International Conference on Autonomous Agents and Multi-agent Systems
- International Conference on Machine Learning
- International Conference on Neural Information Processing Systems
- Transactions on Computational Intelligence and AI in Games
- European Workshop on Reinforcement learning
- Journal of Machine Learning Research
- Journal of Robotics
- Journal Computational Intelligence and AI in Games

Workshops Organized

- ICML Reinforcement Learning Competition, *Organizing Committee*, 2008
- NIPS Workshop: The First Annual Reinforcement Learning Competition, *Principle Organizer*, 2007
- NIPS Reinforcement Learning Workshop: Benchmarks and Bakeoffs II, *Organizing Committee*, 2006

CODE
RELEASED

RL-Glue version 1.0 2006
LANGUAGES: JAVA, C, AND PYTHON. A language independent communication protocol and evaluation framework for reinforcement learning experiments.

RL-Glue version 2.0 2007
LANGUAGES: JAVA, C, AND PYTHON. A version of RL-Glue that allowed benchmarking competitions to be run via remote socket communication.

Adam White

PERSONAL
INFORMATION

Citizenship: Canada

Languages: English